Geographic Information System Analysis Team

Geographic information system (GIS) software is a revolutionary technology that links geographic information with descriptive information and provides a wide array of spatial modeling capabilities. GIS mapping, modeling, and database retrieval technologies allow ERS researchers to, among other things, link land quality to agricultural productivity in developing countries, determine how much U.S. farmland is subject to development pressure, or measure accessibility of low-income populations to USDA food assistance programs in more robust way. Using these capabilities, researchers can integrate data from different disciplines, develop indicators at various geographic levels, manage and analyze spatial and tabular data, and generate maps and other visualization tools to display and communicate their findings. Such integration of disparate data into a single context helps analysts answer social science questions with physical science and other data at detailed spatial resolution—an endeavor severely limited even 10 years ago.

Tom McDonald, USDA/ERS

Back row (l to r): Chris Dicken, Huajun Zhang, Cory Schinkel, Vince Breneman
Front row (l to r): Shawn Bucholtz, Amy Goldian, David Nulph, Bryan McEnaney

Key to these analyses is the ERS GIS Analysis Team. Led by Vince Breneman, the team is as diverse as the research efforts it supports, composed of individuals with spatial modeling expertise, as well as backgrounds in economics, cartography, and computer science. The team divides its time and resources between supporting the ERS research program and aiding senior officials from other USDA agencies in enhancing homeland security.

Shawn Bucholtz, Chris Dicken, and Huajun Zhang support every step of the research process. Through spatial analysis, data visualization, and other data management techniques, they help researchers to establish the conceptual framework and construct the data needed to test hypotheses. In a recent study of manure management in the Chesapeake Bay watershed, spatial gravity models and satellite-derived land cover data were used to help researchers analyze potential increases in producer hauling costs associated with manure management rulings proposed by the Environmental Protection Agency (see *Amber Waves*, June 2003). The development of mapping applications and tools helps researchers to analyze the data and, through interactive maps on the web, share the results with the public. The Agricultural Resource and Environmental Indicators Database and Mapping Tool (www.ers.usda.gov/data/agresources/) and the Summer Food Service Program Map Machine (www.ers.usda.gov/data/sfsp/) are a couple of ERS's most popular online mapping tools.

Amy Goldian, Bryan McEnaney, David Nulph, and Cory Schinkel support homeland security officials in USDA and other agencies by assembling and analyzing data on the Nation's food and fiber system. These analyses aid senior officials in examining the possible effects of disasters or emergencies (such as a food contamination incident, an outbreak of Foot and Mouth disease, or an introduction of Soybean Rust) and designing appropriate responses.

Future efforts of the GIS team include development of advanced visualization features for the web and the development and web delivery of many of ERS's environmental and agricultural indicators and databases. Vince adds, "The diversity of topics and expanding capabilities of technology make this work both interesting and worthwhile."

Tom McDonald, USDA/ERS

Vince Breneman, Team leader